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Alexander B. Grannis
Commissioner

To: Town of New Lebanon Planning Board
From: Karen Strong, Hudson River Estuary Biodiversity Outreach Coordinator, 518-402-8878, klstrong@gw.dec.state.ny.us
Re: Town of New Lebanon Habitat Summary
Date: July 2010

Background

This summary was completed upon request to provide information for the Town of New Lebanon for use in land use planning and decision-making. It identifies major natural features, as well as important stream, forest, wetland, and other habitats with important biological resources based on information available to the NYSDEC. Because it is based only on existing information, it should not be considered a complete biological resource inventory. In the case of New Lebanon, very little information is available. Additional general information can be found in the *Wildlife and Habitat Conservation Framework* developed by the Hudson River Estuary Program (Penhollow et al. 2006). If you have any questions about this summary, or want to know if it needs to be updated, please contact Karen Strong, Biodiversity Outreach Coordinator.

NYSDEC's Hudson River Estuary Program protects and improves the historic and scenic Hudson River watershed for all its residents. The program was created in 1987 and extends from the Troy dam to the Verrazano Narrows. Its core mission is to:

- Ensure clean water;
- Protect and restore fish and wildlife habitats;
- Provide recreation in and on the water;
- Adapt to climate change; and
- Conserve the scenic landscape.

Upland watershed ecosystems—wetlands, forests, stream corridors, grasslands and shrublands—are not only habitats for abundant fish and wildlife, but also support the estuary and provide many vital benefits to human communities. These ecosystems help clean drinking water, clean air, moderate temperature, clean up pollution, and absorb floodwaters. Conserving a diversity of plants and animals maintains these healthy and resilient ecosystems. The Biodiversity Outreach Program was created in partnership with Cornell University to help communities understand what plants, animals, and habitat are found locally; appreciate the value of these resources; and identify local tools to conserve them.

How to use this summary

Maps and written descriptions are provided for the major natural features and each habitat type: streams, forests, wetlands, and calcium-rich areas. Each habitat type is briefly described (including how the map was made) and any significant resources are noted. Major natural features are the most significant resources in your town based on the information available. The species lists that follow the habitat descriptions list the species and some habitats known to occur in your town that are of conservation concern. You will find links throughout this document that will direct you to the internet for more information, including websites, publications, and fact sheets. There are references listed at the end that identify the sources of the information in this document.

While this summary is limited to existing information and is therefore not a substitute for on-the-ground survey and assessment, it provides a starting point for recognizing important natural areas in your town and in the surrounding areas. Effective conservation occurs across property and political boundaries and therefore necessitates a broader view of natural

landscapes. By identifying areas of high-quality resources, this summary will be especially useful for setting priorities that support town planning. Habitat summaries like this one have been used by other communities for open space plans, comprehensive plans, natural resource inventories, and developing critical environmental areas. One Hudson Valley town used the species lists in its comprehensive plan's generic environmental impact statement. Some communities have incorporated their summaries directly into plans, while others use the information to write their own documents.

Though this summary does not contain the detail needed for site planning, it is useful for environmental review. First, by identifying high quality habitats at the town-wide scale, it helps land use decision-makers and applicants understand how a proposed site plan might relate to important areas off-site. Second, the summary informs environmental review by highlighting areas that might need a more detailed assessment. Third, the species lists identify species of conservation concern you may want to address during your reviews.

Please note that some of the habitats and species identified in this document may be protected by state or federal programs. Continue to work with the DEC Region 4 office in Schenectady and other appropriate agencies on those issues.

Conservation

Once you understand the kinds of habitats in your town, you may want to identify conservation actions that protect the resources in order to protect the benefits they provide to the community. Included with this summary are General Conservation Measures for Protecting Natural Areas and Wildlife that can help guide New Lebanon's plans and land-use decisions. More detailed information on the how and why of local habitat conservation is available in *Conserving Natural Areas in Your Community: Smart Growth Strategies for Protecting the Biological Diversity of New York's Hudson River Valley* (Strong 2008). The handbook was published by NYSDEC to support the Hudson River Estuary Biodiversity Outreach Program. It describes in more detail why towns should conserve their biological resources, as well as the tools and techniques that local governments can use to conserve natural areas and wildlife. Chapter 5 covers habitat conservation. A hard copy and CD are provided with this summary.

Species and Habitat lists

Following the general descriptions of habitat, you will find lists of species of conservation concern that have been recorded for the town, though it is almost certainly not a complete list. Species on lists come from the NY Natural Heritage Program, the New York Amphibian and Reptile Atlas, and the NYS Breeding Bird Atlas. Species are included if they are on the state or federal endangered and threatened species list, listed as a Species of Greatest Conservation Need in New York's Wildlife Action Plan, recognized as a responsibility species for the Hudson Valley by Audubon New York, or are other indicators of high quality habitat. Lists of significant ecosystems come from the NY Natural Heritage Program.

How to find more information

The information in this summary can be enhanced by local knowledge. Local studies, maps, plans, and knowledgeable local people can add to detail to these areas, and may reveal unknown, high- quality ecosystems. Biological information in environmental impact statements may be useful, especially when a town has standards for environmental review. If you want help with incorporating additional information into the summary, please contact Karen Strong, Biodiversity Outreach Coordinator.

Important habitats of the Town of New Lebanon

Major Natural Features

Major natural features are the most significant resources in your town based on the information available. It draws from all the information collected for this summary. Figure 1 shows two regionally significant areas near the Town of New Lebanon, as well as trout streams, and the most significant forest resources. The Taconic Ridge is in the far eastern part of town, and the Rensselaer Plateau is located just north of town. Only a tiny portion of the Rensselaer Plateau is in New Lebanon, and a detailed description is not included here. More information can be found in the *Wildlife and Habitat Conservation Framework* developed by the Hudson River Estuary Program (Penhollow et al. 2006). The unique habitats identified by the Farmscape Ecology Program at Hawthorne Valley Farm may indicate the areas of town underlain by calcium-rich bedrock may be a major natural feature, but more assessment is needed.

Taconic Ridge

The Taconic Ridge is in the far eastern edge of town on the border with Massachusetts (Figure 1). This regionally significant resource is identified as a significant biodiversity area by the NYSDEC Hudson River Estuary Program (Penhollow et al. 2006).

> "The Taconic Ridge encompasses large areas of contiguous, high quality, northern hardwood forest underlain by complex metamorphic bedrock. It serves as a principle watershed and recharge area for numerous rich fens and associated rare plant and animal species. The Taconic Ridge extends nearly 60 miles along the eastern edge of New York State, [along Rensselaer, Columbia, and Dutchess Counties] and is about 12 miles wide at its widest point."

The portion of the Taconic Ridge in New Lebanon has a portion of a 1,086 acre Beech-maple mesic forest known as "The Knob," that crosses the border into Canaan. Ecologists reported in 2001 that this forest was good condition and will remain that way provided it remains forested and landowners use sustainable timber management plans with a long rotation. The most significant threat to the Hudson Valley's forest ecosystems is fragmentation into smaller patches.

Other Habitats

The Farmscape Ecology Program at Hawthorne Valley Farm has been working in Columbia County to understand the relationship between agriculture, natural areas, and socio-economics. Their extensive fieldwork throughout the county makes them an especially useful source for this summary. In addition to the information provided for calcium-rich areas and streams, Conrad Vispo notes that New Lebanon is home to plants and animals from more northern areas than typically found in the county. They have found evidence of otter, fisher, bobcat, and porcupine as well.

Calcium-rich areas

Calcium-rich areas, also called calcareous areas, are identified in Figure 2 from the NYS Geological Survey bedrock maps, and the Columbia County Soil Survey maps. The Town of New Lebanon has extensive areas with calcareous soils and bedrock, which is somewhat unusual in the Hudson Valley. These areas have the potential to support unique plants and plant communities. Work by the Farmscape Ecology Program has found a rich forest with limestone outcrops and a great diversity of spring wildflowers at the base of the hill between the Darrow school and the Shaker Swamp. At the source of Stony Kill, they found a circumneutral bog lake, an uncommon habitat type that supports plants and animals typical of both acidic bogs and calcareous marshes (Knab-Vispo, pers. comm.). The approximate locations of the bog lake and woodland are shown in Figure 2. Other habitats that may be present in this area include calcareous wet meadow, fens, carbonate crest ledge and talus habitats, calcareous swamps (red-maple tamarack swamp, for example), limestone woodland, and calcareous talus slope woodland, among others. Further investigation may turn up more unique habitats. The Biodiversity Assessment Manual for the Hudson River Valley (Kiviat and Stevens 2001) describes some of these habitats and provide a list of calcium-loving plants in Appendix 5.

Streams

Stream corridors, including the stream channel itself, wetlands, floodplains, and shoreline vegetation bordering the channel provide important ecosystem services to people of the town, including clean water, fishing opportunities, and

flood management. Hudson River tributary streams and their associated shoreline and floodplain areas provide some of the most productive wildlife habitat in the region. The land in the Town of New Lebanon drains the Kinderhook Creek, part of the Greater Stockport Creek watershed. The Greater Stockport Creek Watershed Alliance meets regularly to share information and provide training on protecting water quality. If it doesn't already, the Town could participate in the alliance to learn how to be more proactive in protecting water quality and quantity. For more information, visit the Greater Stockport Creek Watershed Alliance online or contact Watershed Coordinator Fran Martino at riverhaggie@peoplepc.com or 518-828-1330.

The Streams map (Figure 3) was made from digitized USGS topographic maps, and therefore may be inaccurate or incomplete and will not show many of the intermittent streams in the town. The stream habitat information was determined based on the NYS Department of Environmental Conservation water quality classifications. Streams known to have trout (T) or trout spawning (TS) were identified as coldwater habitats. All stream identified as (TS) are considered excellent habitat, and those with (T) are considered good habitat. Streams without that designation are identified as warmwater habitats, with quality based on water quality for human use—AA is excellent, A and B are good, C is just warmwater. Waters with the classification of D are considered of limited habitat value.

Figure 3 shows important stream habitats in town based on the information we currently have available. The Kinderhook and Wyomanock Creeks, among others, provide high quality coldwater habitat for trout. Trout are sensitive to warmer waters and therefore need trees to shade their streams. While all stream habitats benefit from adequate streamside vegetation, it is especially important for coldwater habitat. One study recommends that at least 80% of the stream banks retain woody vegetation at least 33 feet from the edge of the stream to protect this important fishery.

The Farmscape Ecology Program at Hawthorne Valley Farm has conducted floodplain forest surveys throughout Columbia County. Their work has shown that floodplains that have been continually forested for at least 60 years are home to a unique suite of plants and animals that tolerate occasional flooding, such as Sycamore, Bitternut, and Cottonwood trees as well as Ostrich Fern and False Mermaid Weed (Knab-Vispo and Vispo 2009). These "ancient" forests, as the folks at Hawthorne Valley call them, may have been farm woodlots, but were not completely cleared during that time. Typical floodplain species were recorded at the New Lebanon study site, and the program's research indicates there may be additional ancient forest rich in native species in the floodplain of the Kinderhook and Wyomanock. For a several-mile stretch upriver from its confluence with the Kinderhook Creek, of the recently re-forested floodplain of the Wyomanock is dominated by the exotic Chinese Tree Lilac. It is a popular garden plant, and has not known to be invasive.

Forests

The Large Forests map (Figure 3) was made using a forest layer created from the Multi-Resolution Land Characteristics National Land Cover Database produced by the Environmental Protection Agency in 2001. Roads with a buffer were removed from the map to identify unfragmented forest patches. Interstate roads were buffered by a total of 300 feet, state and county roads by 66 feet. Forest patch size classifications follow the Orange County Open Space Plan (Orange County Planning Department 2004) and cited in Strong (2008).

The town has a lot of forest cover, however, two areas of large forest stand out. One is in the northern part of town and is shared with Stephentown to the north. This forest is divided into two patches (3,584 and 2,176 acre patches) by Stephentown Road. To the south and east, there are larger forests shared with Canaan and Massachusetts, that are part of the Taconic Ridge. The aforementioned 1,086 acre beech-maple mesic forest is within a 2,700 acre forest patch, which is bisected from a 2,600 acre forest by Route 22. The forest is larger as it continues into Massachusetts, and is very close to the Pittsfield State Forest (MA).

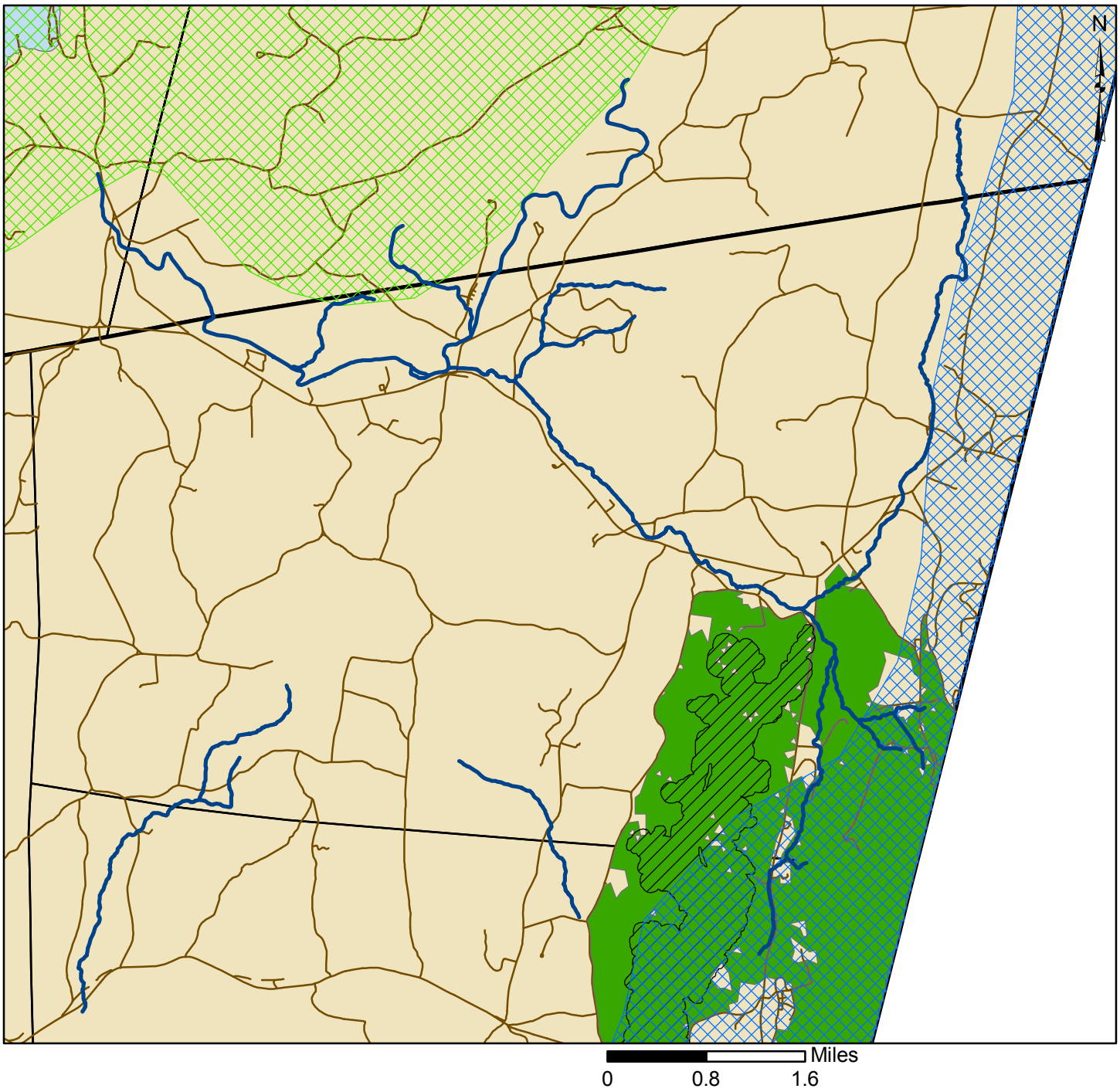
Wetlands

Wetlands not only provide quality habitat for unique plants and animals, but provide important services for human communities, including pollutant removal, flood storage, and carbon sequestration. The Wetlands map (Figure 4) shows wetlands as mapped by the US Fish and Wildlife Service for the National Wetlands Inventory (NWI) as well as some information on potential wetlands based on county soil maps. "Probable wetlands" are those classified in the soil survey as very poorly drained or poorly drained, and "possible wetlands" are those classified as somewhat poorly drained soils

(after Kiviat and Stevens 2001). The National Wetland Inventory data are available for you to view at the US Fish and Wildlife Service website. You will note that the probable and potential wetlands cover a greater area than the NWI wetland layer. NWI maps are known to be inaccurate, generally underestimating wetland area both because on-the-ground wetlands are larger than those shown on the map likely and because smaller and drier wetlands tend to be missed (Zucker and Lau, unpublished report). Nothing can replace the on-the- ground delineation for understanding wetlands. NYSDEC Freshwater wetlands (12.4 acres and larger) were purposefully not identified on the map. If you want more information on these wetlands, please contact the DEC Region 4 office.

Though we have a good sense of where wetlands might be, we do not know which of these are most important for wildlife. The most recent NYS Breeding Bird Atlas has a possible breeding record for the NYS species of special concern, American Bittern, which depends on large wetlands with dense vegetation. The bird was found somewhere within the block shown on Figure 4. Reports of spotted salamander, wood frog, and a Jefferson's hybrid salamander in the NY Amphibian and Reptile Atlas and the North American Amphibian Monitoring Program reveal there are probably vernal pools located in town. Vernal pools are small wetlands in forests (forested vernal pools are often called woodland pools) that hold water for only part of the year, when they serve as important breeding habitat for a group of forest salamanders. They are usually isolated from surface water flows and unprotected by state or federal programs, however, local governments can fill the gap. Consider identifying these features in a town natural resource inventory or during environmental review. To learn more about vernal pool conservation, visit the woodland pool conservation page on the NYSDEC website.

Figure 1: Major Natural Features in the Town of New Lebanon, Columbia County, NY



Legend

- High Quality Stream Habitat
- Rensselaer Plateau signficant biodiversity area
- Taconic Mountains significant biodiversity area
- Largest Forest Patch
- Significant forest type
- Municipal Boundaries
- County Boundaries

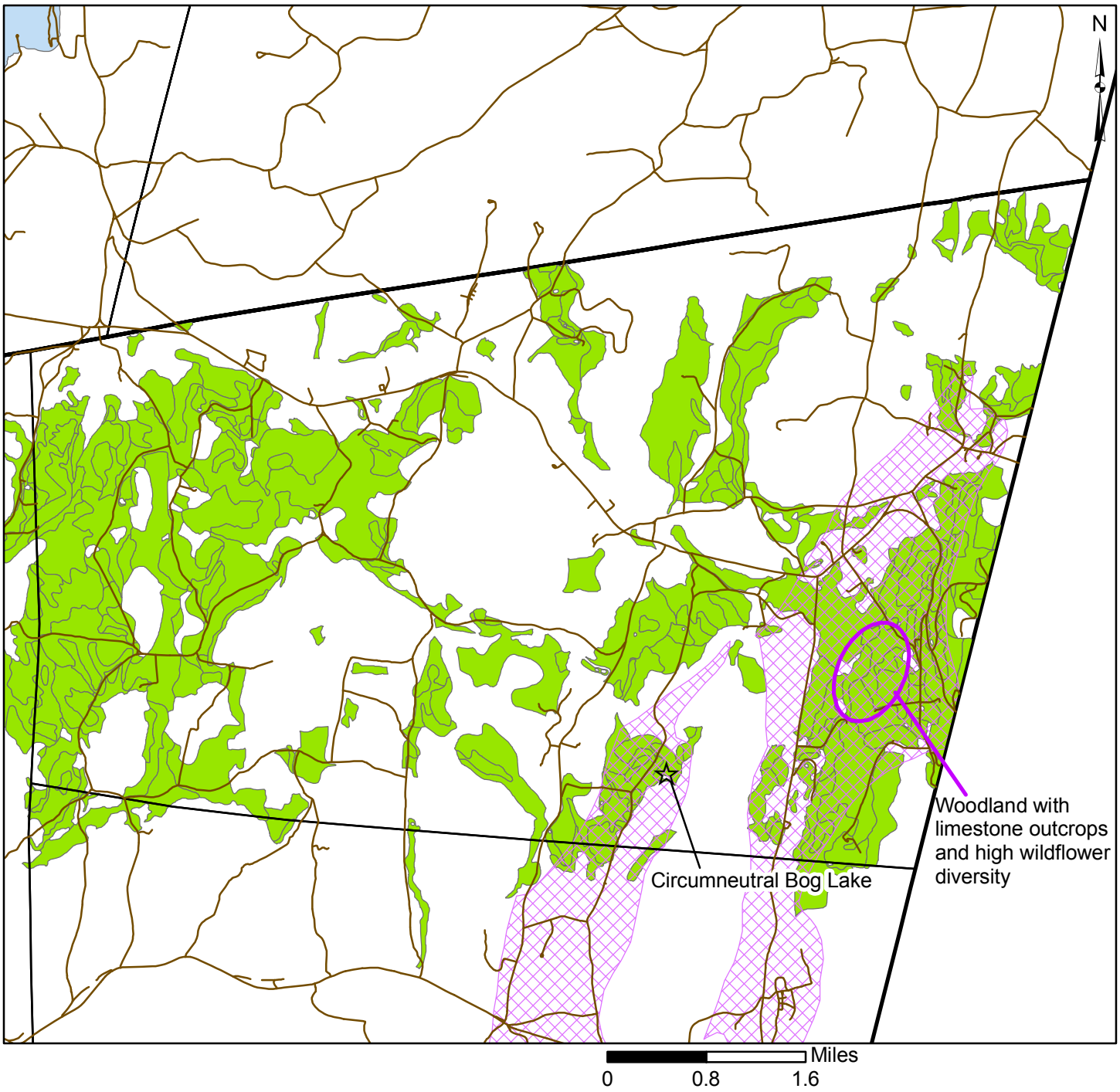
This map shows the most significant *known* natural features in the Town of New Lebanon, Columbia County based on currently available information. Please note, there are limited data available for this town. This map was produced as part of a Habitat Summary for New Lebanon.
For more information, please contact NYSDEC's Hudson River Estuary Biodiversity Outreach Coordinator Karen Strong at (518) 402-8878.
Data Sources: EPA 2001 Multi-Resolution Land Characteristics dataset
New York State Department of Environmental Conservation
NY Natural Heritage Program. Important Areas Digital Data Set [updated 1 Jan 2008].

Map Created 23 June 2010

Hudson River Estuary

Cornell University

Figure 2: Calcium-rich Soils and Bedrock in the Town of New Lebanon, Columbia County, NY



Legend

- Roads
- Municipal Boundaries
- Calcium-rich Bedrock
- Calcium-rich soils
- County Boundaries

This map shows calcium-rich soils and bedrock for the Town of New Lebanon, Columbia County, NY. Areas underlain with calcium-rich (calcareous) soil or bedrock have the potential to provide unique habitats that might be home to rare and uncommon plants and animals. Known uncommon calcareous habitats are also shown. This map was produced as part of a Habitat Summary for the Town. For more information, please contact NYSDEC's Hudson River Estuary Biodiversity Outreach Coordinator Karen Strong at (518) 402-8878.

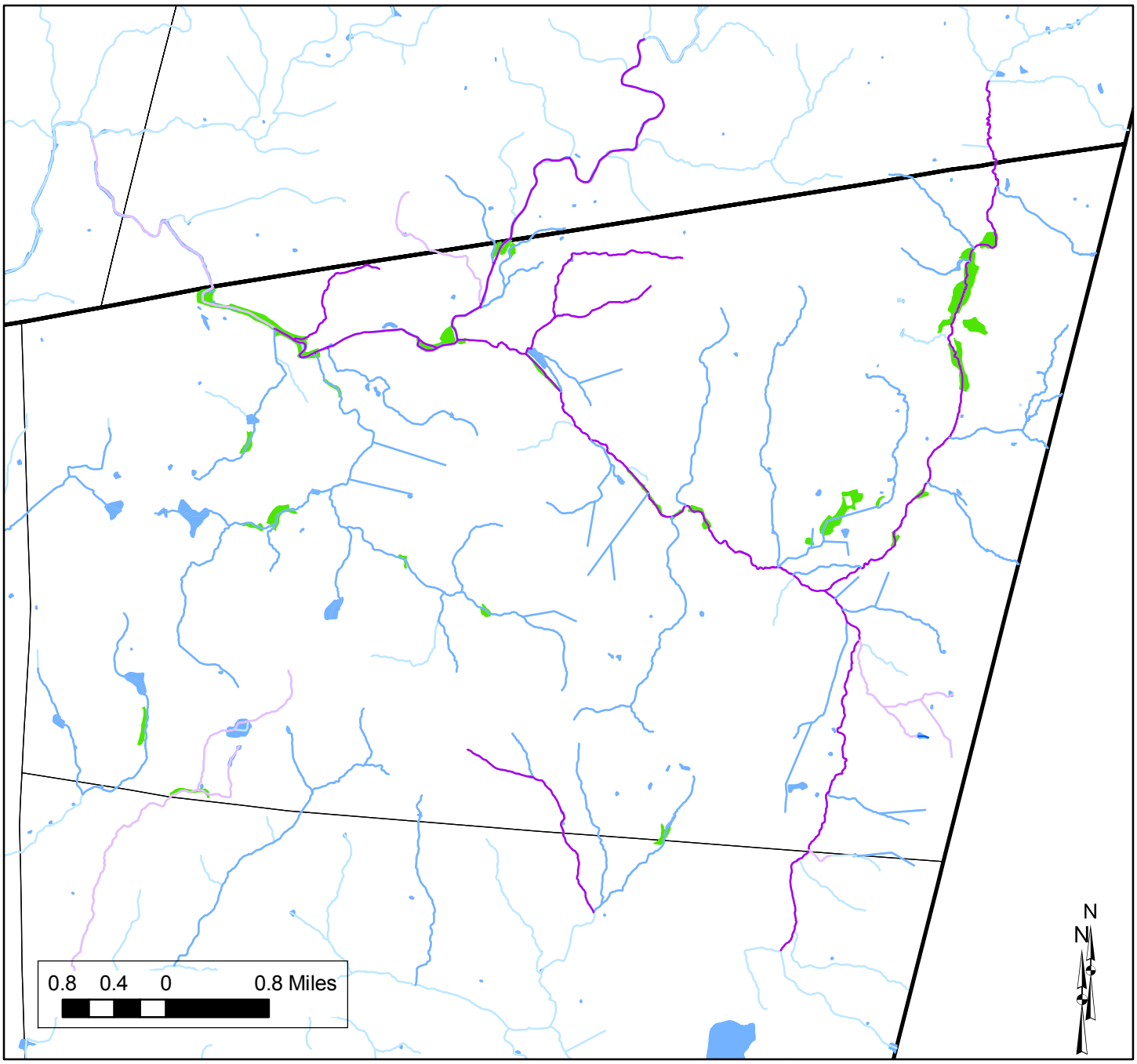
Data Sources: NYS Geological Survey
Columbia County Soil and Water Conservation District
New York State Department of Environmental Conservation
NYS Department of Transportation

Map Created 22 June 2010

Hudson River Estuary

Cornell University

Figure 3: Streams in the Town of New Lebanon, Columbia County



Legend

Stream Habitat

- Coldwater (Excellent)
- Coldwater (Good)
- Warmwater
- Warmwater (Good)
- Other Streams
- "Ancient" Floodplain Forest
- Municipal Boundaries
- County Boundaries

This map shows streams, waterbody, and watershed data, including aquatic habitat data for the Town of New Lebanon, Columbia County. "Ancient" Floodplain Forests are stream side areas that have been continually forested since at least 1948. This map was produced as part of a Habitat Summary for the Town. For more information, please contact NYSDEC's Hudson River Estuary Biodiversity Outreach Coordinator Karen Strong at (518) 402-8878.

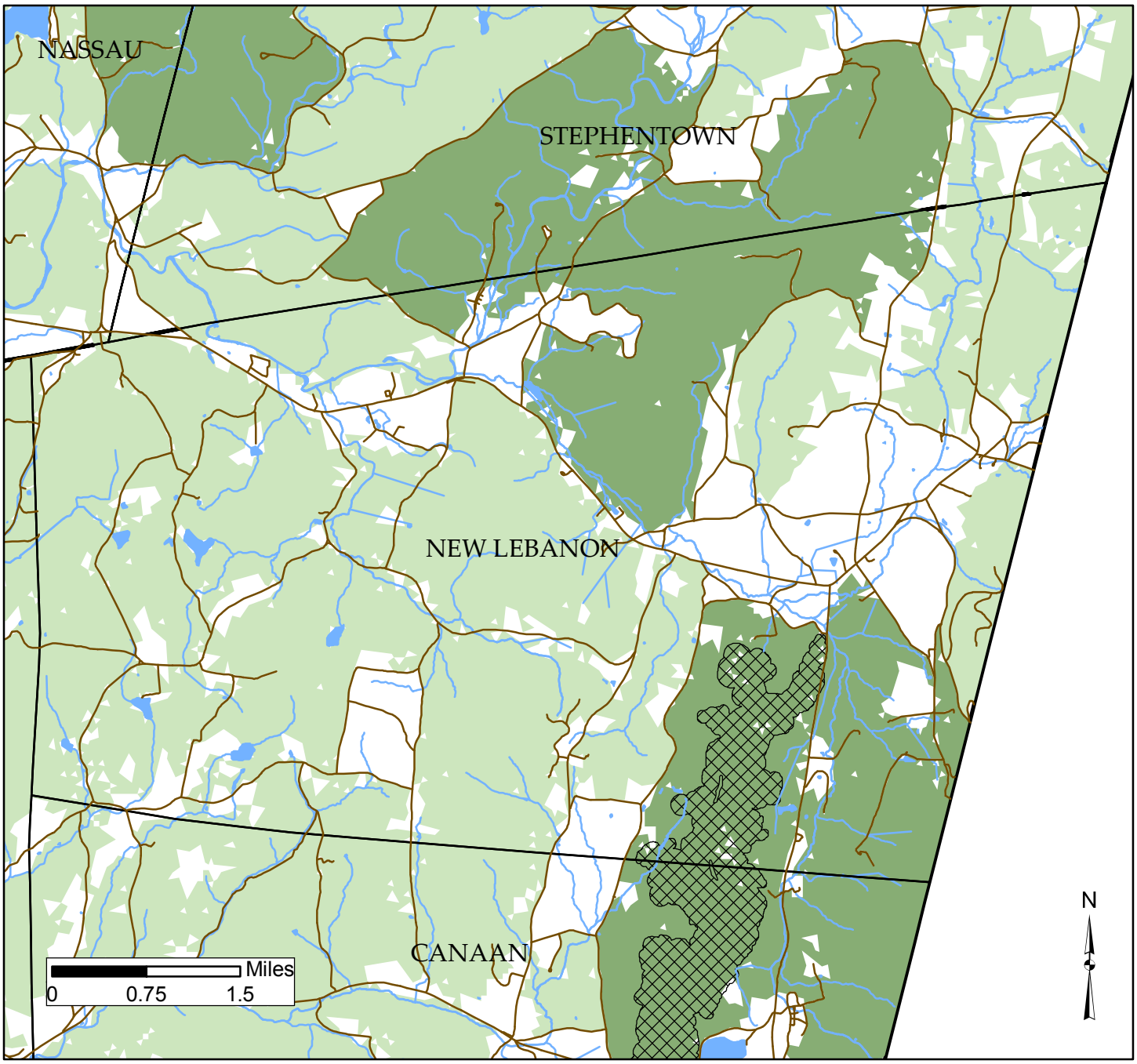
Data Sources: US Geological Survey, New York State Department of Environmental Conservation, New York State Department of Transportation, Hawthorne Valley Farmscape Ecology Program (unpublished data)

Map Created 6 July 2010

Hudson River Estuary

Cornell University

Figure 4: Large Forests (200 Acres and Larger) in the Town of New Lebanon, Columbia County, NY



Legend

Forest Patch Size (Acres)

- 200 - 1999: Stepping Stone
- 2000 - 4999: Locally Significant
- 5000 - 14999: Regionally Significant
- 15000+: Globally Signfiicant
- Significant forest type
- Streams
- County Boundaries
- Municipal Boundaries
- Roads

This map shows forest patches 200 acres and larger in the Town of New Lebanon, Columbia County. Forest cover data was obtained from the National Land Cover Database, and roads were used to delineate the forest patches. This map was produced as part of a Habitat Summary for the Town. For more information, please contact NYSDEC's Hudson River Estuary Biodiversity Outreach Coordinator Karen Strong at (518) 402-8878.

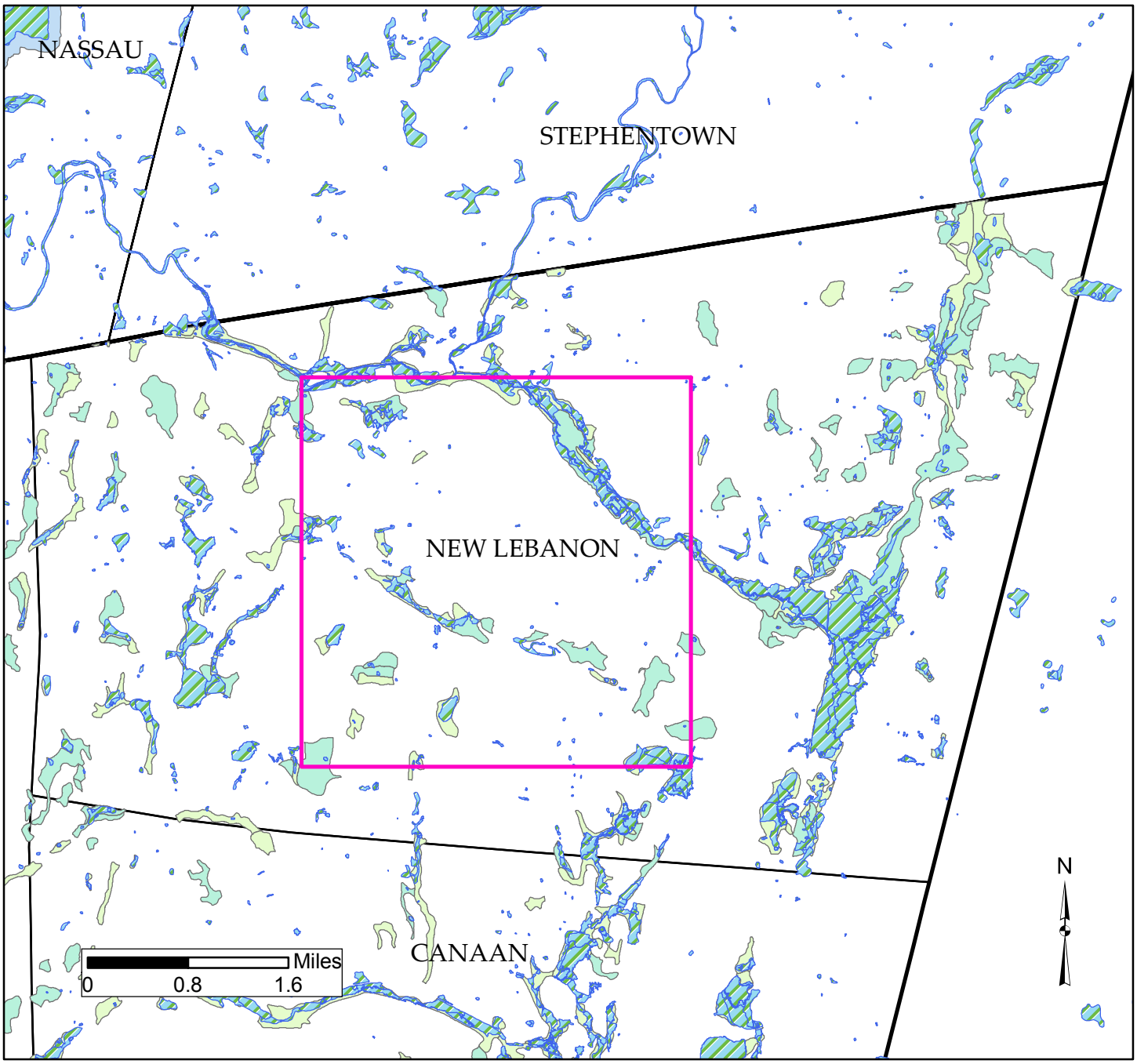
Data Sources: EPA 2001 Multi-Resolution Land Characteristics dataset
New York Natural Heritage Program Important areas dataset [updated January 2008].
New York State Department of Environmental Conservation
New York State Office of Cyber Security and Critical Infrastructure Coordination

Map Created 22 June 2010

Hudson River Estuary

Cornell University

Figure 5: Wetlands in the Town of New Lebanon, Columbia County, NY.



Legend

- American Bittern
- Wetlands (National Wetland Inventory)
- Columbia County Probable wetland
- Columbia County Possible wetland
- Municipal Boundaries
- County Boundaries

This map shows wetlands for the Town of New Lebanon, Columbia County, NY. Probable and possible wetlands were identified by drainage class on the Columbia County Soil Survey. See the habitat summary text for details. This map was produced as part of a Habitat Summary for the Town.
For more information, please contact NYSDEC's Hudson River Estuary Biodiversity Outreach Coordinator Karen Strong at (518) 402-8878.
Data Sources: NYS Geological Survey
Columbia County Soil and Water Conservation District
New York State Department of Environmental Conservation
NYS Department of Transportation

Map Created 22 June 2010

Hudson River Estuary

Cornell University

Species and Habitat lists

Table 1. Known Significant Reptiles and Amphibians of the Town of New Lebanon. Data are from the HUNY Amphibian and Reptile Atlas. Other species have been reported from town, but only those that indicate high quality habitat are included here.

Common name	Scientific Name	Significance	Stream-Associated Species
Spotted Salamander	*Ambystoma maculatum*	Vernal pool indicator	
Jefferson's salamander complex	*Ambystoma jeffersonianum x laterale*	NYS Species of Special Concern	
Wood Frog	*Rana sylvatica*	Vernal pool indicator	

* denotes NYS Species of Greatest Conservation Need (SGCN)

Table 2. Known Significant Birds of the Town of New Lebanon. Data from New York Breeding Bird Atlas 2000 [Internet]. 2000 - 2005. Release 1.0. Albany (New York): New York State Department of Environmental Conservation. [updated 2007 Jun 11; cited 2009 Aug 18]. Conservation Priority, habitat type, and links from Audubon NY (2009)UH Data are from blocks that are more than 50% in New Lebanon, Shown here is a subset of that list, we selected birds identified as a special conservation responsibility for the Hudson Valley (Audubon NY) and those especially sensitive to fragmentation (Dewan 2008).

Common Name	Scientific Name	General Habitat Type	Stream-Associated Species	More information from...
Forest Birds				
American Redstart	*Setophaga ruticilla*	Forest	Y	
Baltimore Oriole	*Icterus galbula*	Forest		
Black-and-white Warbler	*Mniotilta varia*	Forest		Audubon
Black-billed Cuckoo*	*Coccyzus erythropthalmus*	Forest		Audubon
Broad-winged Hawk	*Buteo platypterus*	Forest		Audubon
Canada Warbler	*Wilsonia canadensis*	Forest		
Downy Woodpecker	*Picoides pubescens*	Forest		Audubon
Eastern Wood-Pewee	*Contopus virens*	Forest		Audubon
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Forest		Audubon
Ruffed Grouse*	*Bonasa umbellus*	Forest		Audubon
Scarlet Tanager*	***Piranga olivacea***	**Forest**		**Audubon**
Veery	*Catharus fuscescens*	Forest		Audubon
Wood Thrush*	*Hylocichla mustelina*	Forest		Audubon
Yellow-throated Vireo	*Vireo flavifrons*	Forest	Y	Audubon
Grassland Birds				
American Kestrel	*Falco sparverius*	Grassland		Audubon
Bobolink*	*Dolichonyx oryzivorus*	Grassland		Audubon
Eastern Kingbird	*Tyrannus tyrannus*	Grassland		Audubon
Savannah Sparrow	*Passerculus sandwichensis*	Grassland		Audubon
Shrubland Birds				
Blue-Winged Warbler*	***Vermivora pinus***	**Shrubland**		**Audubon**
Brown Thrasher*	***Toxostoma rufum***	**Shrubland**		**Audubon**
Chestnut-sided Warbler	***Dendroica pensylvanica***	**Shrubland**		

Common Name	Scientific Name	General Habitat Type	Stream-Associated Species	More information from…
Eastern Towhee	*Pipilo erythrophthalmus*	Shrubland		Audubon
Field Sparrow	*Spizella pusilla*	Shrubland		Audubon
Indigo Bunting	***Passerina cyanea***	**Shrubland**		**Audubon**
Prairie Warbler*	*Dendroica discolor*	Shrubland		Audubon
Wetland Birds				
American Bittern**	*Botaurus lentiginosus*	Wetland		Audubon
Northern Waterthrush	*Seiurus noveboracensis*	Wetland		
Swamp Sparrow	***Melospiza georgiana***	**Wetland**		
Birds of Other Habitats				
Belted Kingfisher	*Megaceryle alcyon*	open water	Y	Audubon
Chimney Swift	*Chaetura pelagica*	urban		

* denotes NYS Species of Greatest Conservation Need (SGCN)
** denotes NYS Species of Special Concern and SGCN
*** denotes NYS Threatened Species and SGCN
Species in bold are known to be particularly sensitive (Dewan 2008).

Table 3. Significant ecosystem in the Town of New Lebanon. This information comes from the New York Natural Heritage Program Biodiversity Databases and is publically available from the New York Nature Explorer. More information on this ecosystem can be found at http://guides.nynhp.org.

Common Name	Description	Scientific Name	State listing
Beech-Maple Mesic Forest	High quality common	n/a	

General Conservation Measures for Protecting Natural Areas and Wildlife

Hudsonia Ltd.

- **Protect large, contiguous, unaltered tracts** wherever possible.
- **Preserve links** between natural habitats on adjacent properties.
- **Preserve natural disturbance processes**, such as fires, floods, tidal flushing, seasonal drawdowns, landslides, and wind exposures wherever possible. Discourage development that would interfere with these processes.
- **Restore and maintain broad buffer zones** of natural vegetation along streams, along shores of other water bodies and wetlands, and at the perimeter of other sensitive habitats.
- In general, **encourage development of altered land** instead of unaltered land wherever possible.
- **Promote redevelopment of brownfields**, other post-industrial sites, and other previously-altered sites (such as mined lands), "infill" development, and "adaptive re-use" of existing structures wherever possible, instead of breaking new ground in unaltered areas.
- **Encourage pedestrian-centered developments** that enhance existing neighborhoods, instead of isolated developments requiring new roads or expanded vehicle use.
- **Concentrate development along existing roads**; discourage construction of new roads in undeveloped areas. Promote clustered development wherever appropriate, to maximize extent of unaltered land.
- **Direct human uses toward the least sensitive areas**, and minimize alteration of natural features, including vegetation, soils, bedrock, and waterways.
- **Preserve farmland potential** wherever possible.
- **Minimize area of impervious surfaces** (roads, parking lots, sidewalks, driveways, roof surfaces) and maximize onsite runoff retention and infiltration to help protect groundwater recharge, and surface water quality and flows.
- **Restore degraded habitats wherever possible**, but do not use restoration projects as a "license" to destroy existing habitats.

Source: Kiviat, E. & G. Stevens. 2001. Biodiversity Assessment Manual for the Hudson River Estuary Corridor. NYS Department of Environmental Conservation, Albany, NY.

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